LUNG AND BREAST CANCER DEATHS AMONG ARIZONA FEMALES, 1970-1999

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SUMMARY

For the past 17 years, the number of women dying of lung cancer in Arizona has surpassed the number dying of breast cancer. In 1999, deaths from lung cancer for Arizona women totaled 1102 and deaths from breast cancer totaled 657. There was a steady increase in female lung cancer death rates between 1970 to 1987, and then the rate stabilized at around 29 deaths per 100,000 women for the past 12 years (1988 to 1999). Breast cancer mortality rates have decreased since 1970, with an impressive 17% decline noted over the past 12 years. These findings are generally similar to national trends.

BACKGROUND

Lung and breast cancers are the leading causes of cancer deaths among females in the United States. This study updates an analysis in 1989 by the Arizona Department of Health Services[1] to determine: 1) the current mortality rates of cancer of the lung and breast in Arizona females, and 2) whether progress has been made in reducing the death rates for these two sites .

METHODS AND DATA SOURCES

We obtained data about the number of deaths due to lung and breast cancer as the underlying cause of death from the computer tapes of death certificates filed with the Arizona Office of Vital Records. Estimates of the annual age-specific population of Arizona (Appendix 1) were obtained from the Arizona Department of Economic Security (DES). The models used to estimate the annual population are described in Appendix 2. We then calculated age-adjusted rates by the Adirect method@ of applying the observed age-group-specific rates to the appropriate age group of the standard million US population of 1970 (see Appendix 2 and 3).

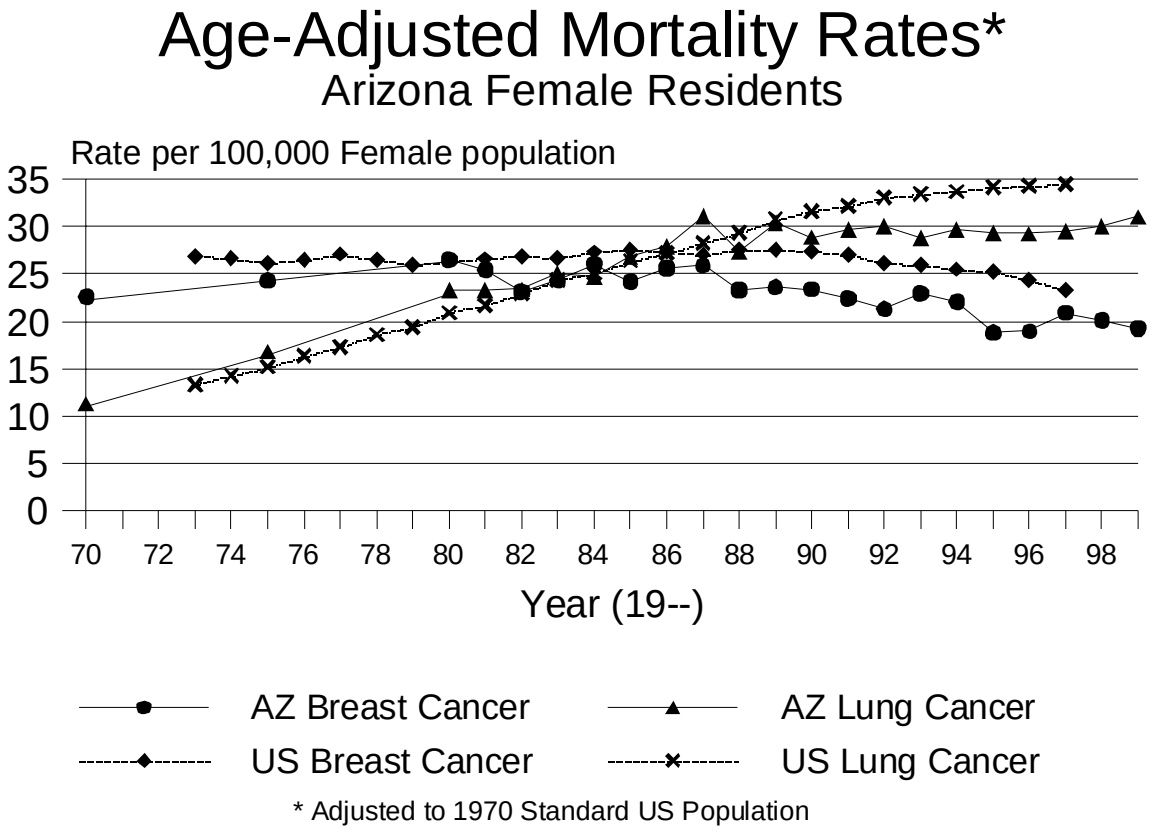
In order to compare cancer rates in Arizona for the period of 1970 to 1999, we calculated age-adjusted mortality rates standardized to the 1970 US census age distribution. This reference population is commonly used by cancer researchers to calculate age-adjusted rates. Age-adjustment removes the effect that increased longevity has on cancer mortality rates. Additionally, age adjustment permits a fair comparison of Arizona=s rates over long periods of time to national rates.

Smoking rates and mammography rates are obtained from the Arizona Behavioral Risk Factor Survey. This telephone-based survey of adults, age 18 and older, is conducted monthly throughout the year. The number of women reached in the survey has increased from around 900 in the 1980's to 1,200 in the late 1990's. The survey=s margin of error is approximately 6% for the data shown.

RESULTS

The annual number of deaths due to lung and breast cancers (see Table 1) has increased since 1988. Part of the increase in number of deaths is due to the growth in Arizona=s population (see Appendix 1). Calculation of age-adjusted rates per 100,000 females residents accommodates for the growth in the population, and takes into account the changing age distribution. In the past 12 years the breast cancer mortality rate has decreased by 17% from 23.8 deaths per 100,000 females in 1988 to 19.3 deaths in 1999. The lung cancer mortality rate has been fairly steady during the past 12 years ranging from 27 to 31 deaths per 100,000 females. During 1982 lung cancer became the leading cancer killer of females, surpassing breast cancer for the first time. **Figure 1** presents Arizona and U.S. data, which also show that national lung cancer death rates have increased and breast cancer rates have decreased. Arizona=s breast cancer mortality rate has been consistently lower than the U.S. rate throughout the past thirty years.

Figure 1



The cigarette smoking rates for women in Arizona have decreased from around 24% in 1986 to 16.6% in 1999. These rates are slightly lower than the smoking rates for women in the U.S (see **Figure 2**).

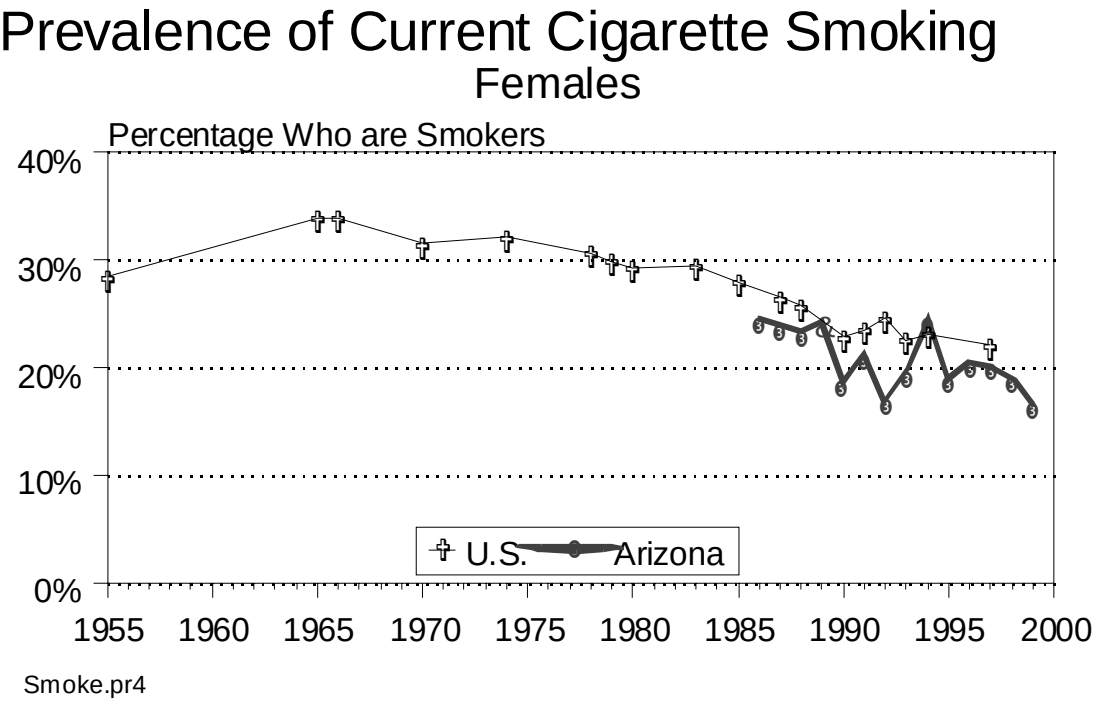


Figure 2. Proportion of women, age 18 and older, who report that they are current cigarette smokers. Source: Behavioral Risk Factor Survey, Arizona; National Health Interview Survey, 1965-1997, United States. *MMWR 1999; 48(43): p988 and Current Population Survey, 1955.*

COMMENT

Lung Cancer

Fifty years ago lung cancer was a rare disease, ranking ninth among cancers as a cause of death among women. Now lung cancer has risen to be the leading cause of cancer deaths among women, surpassing even breast cancer. It is appropriate to describe the rise in lung cancer among women as an epidemic.

In explaining the trend of lung cancer rates, we must look for exposures or changes that occurred between 10 and 40 years previously, which represents the estimated latent period for lung cancer. A substantial number of women began smoking cigarettes in the 1940's. Nationally, the prevalence of smoking peaked in females in the mid 1960's and has been declining slowly since then. In 1999, approximately 17% of Arizona women smoke, a 12% decrease from 10 years ago (Arizona Behavioral Risk Factor Survey data). However, it is highly unlikely that the U.S. or Arizona will reach the Healthy People 2000 Objective of fewer than 15% of adults who smoke.

Breast Cancer

The breast cancer mortality rate in Arizona has been steadily decreasing, especially over the past 10 years. This trend reflects the national trend of breast cancer mortality which has also been decreasing slightly over the past 10 years. There may be several reasons for this decrease: improvements over the past 10 years in early detection (mammography), wider utilization of mammography[2], advances in chemotherapy and radiation treatments, and increased public awareness about early detection and screening for breast cancer. Comparisons of breast cancer rates from other countries suggest a number of factors may influence breast cancer rates: age of first menstruation, age of first pregnancy, breast feeding (which is protective), family history, and perhaps diet and socioeconomic status.

In order to have a complete picture of the pattern of breast cancer among the population, both incidence and mortality rates must be examined. Nationally, breast cancer incidence rates for the past 10 years have been stable, with a rate of 110 new breast cancer cases per 100,000 women per year in the United States. Arizona=s breast cancer incidence rate is also steady and slightly lower than the national rate since 1995, the first year the Arizona Cancer Registry is considered to have complete data. While the number of new breast cancer cases increases each year, the population of women has been increasing at a faster rate and the mortality rates due to breast cancer have been slightly decreasing. This is supportive evidence that the early detection methods such as mammography and an increased public awareness of breast cancer detection has helped in catching this disease early. Additionally, the Surveillance, Epidemiological and End Results (SEER) program of the National Cancer Institute indicates that in the U.S. from the late 80s through the 1990s, the number of breast cancer cases diagnosed in earlier stages (stage 1) increased while the number of cases diagnosed in later stages (stages 3 and 4) remained steady. We believe this reflects increasing public awareness of the importance of detecting breast cancer in its earliest stages.

RECOMMENDATIONS

1. Distribute this report to the ADHS Tobacco Education and Prevention Program and the

ADHS Breast and Cervical Cancer Screening Program.

2. *Lung Cancer -- Data Needs*
   a. Sub groups (such as residents of specific counties, race/ethnic groups, or age-groups) should be assessed to determine if they smoke at elevated rates. This can be accomplished for the adult population by using the current Behavioral Risk Factor Survey.
   b. Document the prevalence of smoking among teenagers and young adults because these groups are particularly at risk for starting the cigarette habit.
   c. Advocate for a system to monitor the smoking rates of school-aged children because initiation of smoking often occurs in middle and high school.

3. *Breast Cancer -- Data Needs*
   Explore and monitor the utilization rates for cancer screening and diagnosis modalities (e.g., breast self-examination, mammography) statewide and among high risk groups. This can be accomplished using the current Behavioral Risk Factor Survey. Because the benefit of mammography is seen when women are re-screened annually (in contrast to the question that asks AHave you *ever* had a mammogram?@), ADHS should routinely report the proportion of women who receive mammography within the past two years. This will better address the population who are *re-screened*.

Table 1: Number of Deaths due to Female Lung and Breast Cancer Among Arizona Residents
L = Lung Cancer; B = Breast Cancer

	1988		1989		1990		1991		1992		1993		1994		1995		1996		1997		1998		1999	
Age Group	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B
0-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5-9	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
10-14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
15-19	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-24	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
25-34	1	9	1	9	2	9	0	9	1	4	0	11	0	7	1	3	0	9	2	5	1	13	0	7
35-44	8	43	11	27	16	42	5	30	11	42	19	38	13	46	18	36	10	46	15	48	15	55	19	39
45-54	43	59	67	80	38	65	57	88	63	75	62	94	61	95	58	69	51	71	47	102	59	101	66	100
55-64	145	116	160	87	154	117	162	105	164	103	151	105	168	100	164	110	149	100	147	131	187	114	198	112
65-74	239	120	247	148	280	172	294	152	306	133	307	167	325	168	332	151	381	156	395	140	365	157	365	158
75+	166	145	188	165	253	156	255	157	262	204	277	200	309	222	341	185	365	208	406	236	396	204	454	241
Total	**602**	**493**	**674**	**516**	**744**	**561**	**773**	**542**	**807**	**561**	**816**	**617**	**877**	**638**	**915**	**554**	**956**	**590**	**1012**	**662**	**1023**	**644**	**1102**	**657**

Source: ADHS Health Status and Vital Statistics Program

Appendix 1:Age-Specific Population Estimates of Females in Arizona

Age Group	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
< 5	140068	145216	149563	154077	158554	164252	167073	172965	176667	178329	184083	188800
5-9	129277	134690	139773	141601	143638	148076	151858	160327	167370	171566	179515	185872
10-14	117847	122984	129175	133609	138326	144955	147761	154387	159476	161162	167547	175562
15-19	128222	128328	126864	124238	125927	130396	136562	144390	151650	157962	164675	169489
20-24	137344	135897	134480	136603	138048	139011	141664	142712	141826	145493	148918	153418
25-34	311515	313667	310386	312320	313873	315044	321478	324806	325001	324101	317703	311937
35-44	245569	255899	263390	276643	285432	297357	314592	329600	341644	353851	361043	366291
45-54	168304	174788	177702	183991	199354	212908	230434	246661	261424	277842	288568	301549
55-64	158915	158423	157022	158026	160459	164100	171506	177622	183075	191861	201869	210903
65-74	149465	154212	158933	163011	167637	172538	176694	179721	181172	181452	181764	181725
75+	103005	108486	113984	120275	126619	133022	139299	145301	151827	157413	162908	168318
Total	**1789531**	**1832590**	**1861272**	**1904394**	**1957867**	**2021659**	**2098921**	**2178492**	**2241132**	**2301032**	**2358593**	**2413864**

Source: Population numbers for the years 1988 through 1999 are derived from the US Bureau of the Census population estimates (Series P25-1106 for 1988 and 1989, published 8/1995, and Series P25-1127 for 1990-1999, published 3/2000.

Appendix 2:

The numerators were gathered from the ADHS Vital Statistics tape for the years 1988-1999 by the Health Status and Vital Statistics Section of the Office of Epidemiology and Statistics. Data was aggregated into 11 age groups as follows: less than 5, 5-9, 10-14, 15-19, 20-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75+. For these study years female breast cancer is coded as ICD 174 (8th and 9th revision); lung cancer is coded as ICD 162 (8th and 9th revision). The U.S. standard million population of 1970 was selected for age-adjusting.

The denominators used for the study years 1988-1999 were derived from the US Bureau of the Census population estimates for Arizona (Series P25-1106 for 1988 and 1989, published 8/1995, and Series P25-1127 for 1990-1999, published 3/2000). The table below is an example of how the age-adjusted mortality rate was calculated for each year.

Sample calculation for age-adjusting the mortality rate of 1998, using the 1970 U.S. Population as the Standard
Lung Cancer Mortality in Arizona Females

WEIGHT	AZ 1998	FEMALE	Lung deaths	Obs. Rate Per 100,000	Adjusted rate per 100,000
US 1970	Age group	Pop. DES	females		
0.084416	0-4	184,083	0	0	0
0.098204	5-9	179,515	0	0	0
0.102304	10-14	167,547	0	0	0
0.093845	15-19	164,675	0	0	0
0.080516	20-24	148,918	0	0	0
0.066	25-29	155,287	0	0	0
0.056	30-34	162,416	1	0.615	0.0344
0.055	35-39	184,463	1	0.5421	0.0298
0.059	40-44	176,580	14	7.9284	0.4677
0.06	45-49	156,586	12	7.6635	0.4598
0.055	50-54	131,982	47	35.6109	1.9586
0.049	55-59	107,127	84	78.411	3.8421
0.042	60-64	94,742	103	108.716	4.5660
0.034	65-69	93,527	165	176.419	5.9982
0.027	70-74	88,237	200	266.662	6.1198
0.037547	75+	162,908	396	243.082	6.5632
	Total	2,358,593	1023	--	30.0401

Appendix 2 Continued
*** Standard million population used for this report:**

Age Group	Population
All Ages	1,000,000
< 5	84,416
5-9	98,204
10-14	102,304
15-19	93,845
20-24	80,516
25-29	66,000
30-34	56,000
35-39	55,000
40-44	59,000
45-49	60,000
50-54	55,000
55-59	49,000
60-64	42,000
65-69	34,000
70-74	27,000
75+	37,547

Appendix 3
Age-Adjusted Mortality Rates per 100,000 Arizona Resident Females
Rates are adjusted to US standard population of 1970

Year	Breast Cancer	Lung Cancer
1988	23.30	27.30
1989	23.60	30.34
1990	23.37	28.88
1991	22.43	29.72
1992	21.27	30.02
1993	22.97	28.75
1994	22.08	29.63
1995	18.79	29.31
1996	18.96	29.25
1997	20.89	29.54
1998	20.08	30.04
1999	19.25	31.03

Endnotes

1. Flood, T. *Lung and Breast Cancer Mortality, Females, 1970-1987.* ADHS, March, 1989.

2. ADHS. *Behavioral Risk Factor Survey, 1999.* Bureau of Public Health Statistics, unpublished data, 2001. 76% of women age 50 and older had a mammogram with the past 2 years.